

# **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.





*"Welcome Shelter Near Trail's End"*

FEDERAL-STATE COOPERATIVE  
SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for

MISSOURI and ARKANSAS DRAINAGE BASINS

MARCH 1, 1947

By

Division of Irrigation, Soil Conservation Service

United States Department of Agriculture

and

Colorado Agricultural Experiment Station

---

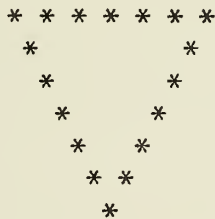
Data included in this report were obtained by the agencies named above in cooperation with the U. S. Forest Service, National Park Service, State Engineers of Colorado, Wyoming and New Mexico and other Federal, State and local organizations.



## FEDERAL-STATE COOPERATIVE

# SNOW SURVEYS AND IRRIGATION WATER FORECASTS

MISSOURI-ARKANSAS DRAINAGE BASINS



Report Prepared by

Division of Irrigation

Soil Conservation Service

and

Colorado Agricultural Experiment Station

Fort Collins, Colorado



## WATER SUPPLY OUTLOOK

### MISSOURI-ARKANSAS DRAINAGE BASINS

March 1, 1947

The water supply outlook on the Missouri River and its tributaries in Montana continues to be favorable. Snow is especially heavy near the Continental Divide. Throughout Wyoming the outlook is very favorable. On the watershed of the Shoshone the water content of the snow is over 40 percent above normal. Storage behind Buffalo Bill dam is 15 percent lower than March 1, 1946. On the headwaters of the upper Big Horn and the North Platte the snow cover is 10 to 20 percent above average and soil moisture conditions are generally good. Storage in the principal North Platte reservoirs in Wyoming is about 20 percent under a year ago. In the South Platte drainage the irrigation water prospects are very satisfactory because of good snow at lower mountain elevations and in the valley. Snow cover in the mountain watershed of the Arkansas is now above last year and the valley area is snow covered well out into the plains area.

#### Missouri River and Tributaries in Montana

Snow cover at higher elevations in Montana is considerably above average. The snow accumulation is about 50 percent above normal near the Continental Divide northwest from Yellowstone Park. Heavy snow is also measured along the upper Missouri and at Marias Pass. On the headwaters of the Gallatin and Yellowstone Rivers the water content of the snow runs from 15 to 20 percent above normal and only slightly above last year. Soil moisture, range and crop conditions are reported as good. Recent precipitation has been slightly sub-normal in Montana but seasonal precipitation has been high. Summer runoff into the Missouri River and most of its tributaries will be somewhat above average. There is considerable variation in reservoir storage but in general water in storage is about the same as last year.

#### Wyoming

Shoshone: Storage in the Buffalo Bill reservoir is above the past ten year average but only 85 percent of March 1, 1946. The accumulation of snow on the headwaters of the Shoshone River has been well above normal during February and now the snow cover is 44 percent above the 12-year average and 43 percent above last year. Precipitation in the Powell area has been deficient and additional moisture will be necessary for spring planting. Range conditions are fair.





Big Horn: Snow cover on the Big Horn watershed above Riverton is about 20 percent above last year and 25 percent above average. The water content is unusually heavy at the head of the Wind River at Brook's Lake. Snow on the courses located on the Popo Agie River is normal or slightly below. Precipitation at lower elevations has been light and the top soil is dry. Range conditions are reported as from fair to good. Snow covers the ground in the lower Big Horn area.

Sweetwater: Snow conditions at the head of the Sweetwater River are still above normal and about the same as last year. Summer runoff from the stream will be satisfactory.

Cheyenne: Snow in the Black Hills area is below average and a little better than last year. Precipitation at lower elevations on the Belle Fourche project has been well above normal and the soil conditions are excellent. Storage in Belle Fourche Reservoir is now 149,780 acre-feet as compared to 133,300 a year ago.

Poudre: Snow-water content on the Red Fork course is 23 percent above average. Precipitation at lower elevations has been above normal.

North Platte: The accumulation of snow on the watershed of the North Platte was much above average during February. The snow-water content is 12 percent over March 1, 1946 and 11 percent over the 12-year average. On the Old Fattle course, west of Encampment, the water content is 33 inches, the greatest March 1 reading over the past 11 years. Precipitation over the watershed has been in excess of the last winter season. The runoff in this stream may be expected to be above average this summer. Soil moisture in the Wyoming and western Nebraska area is only fair. Storage in the four principal reservoirs in Wyoming is now 882,000 acre-feet as compared to 1,008,000 on March 1, 1946. In the Kingsley and Sutherland Reservoirs there is now stored 1,208,000 acre-feet of water, slightly more than a year ago.

Laramie: On the headwaters of this stream the water content of the snow is now 10 inches as compared with 9 inches a year ago. Prospects for normal runoff in this stream are now very good. Storage in the Wheatland Reservoir is now about 60 percent of March 1 last year. The entire watershed of the river is snow covered.

#### South Platte River Basin

Cache la Poudre: Snow at higher elevations on the watershed of the Poudre River is slightly better than average but 5 percent under last year on March 1. However, the entire watershed is snow covered in contrast to last year when the ground was generally bare under 7500 feet elevation. Water in storage is a little under a year ago. Soil moisture and crop conditions are good.

Big Thompson: The general prospect for water supply from the Big Thompson is fairly good. The snow cover at higher elevations is only a little above normal and slightly under last year. The watershed is covered with light snow. Reservoir storage is only 35 percent of March 1, 1946. Soil moisture in the valley area is good.



St. Vrain: The water content of the snow on Wild Basin courses is 11.3 inches as compared with 8.9 inches last year. Snow cover in the valley area is well above normal. Crop, range and soil conditions are good.

Boulder Creek: On the headwaters of Boulder Creek the water content of the snow is 18 percent above last year and 51 percent above normal. The mountain area at lower elevations is generally snow covered. Precipitation in the valley area has been above normal through the winter season. Soil moisture conditions are good.

Clear Creek: The snow cover on the headwaters of this stream is 20 percent above average and practically the same as last year. Precipitation over the mountain and valley area has been above normal. The soil moisture situation is reported as good.

South Platte Above Denver: Storage in reservoirs in South Park and above Denver is now about 165,000 acre-feet. On March 1, 1946 it was 192,000. The water content of the snow on courses at higher elevations is 5.8 inches as compared to 5.4 last year. Precipitation has been above normal for the winter season. The outlook for the 1947 irrigation season is good.

In the lower South Platte valley in Colorado the prospects for adequate water supplies are favorable. From Fort Lupton to Fort Morgan area soil and crop conditions are excellent. Reservoir storage in this area is well above average. In the vicinity of Sterling the precipitation is normal and the surface soil is drying. There has been a recent light snow. Storage in the principal reservoirs in the Sterling district is now 104,000 acre-feet as compared to 116,000 a year ago.

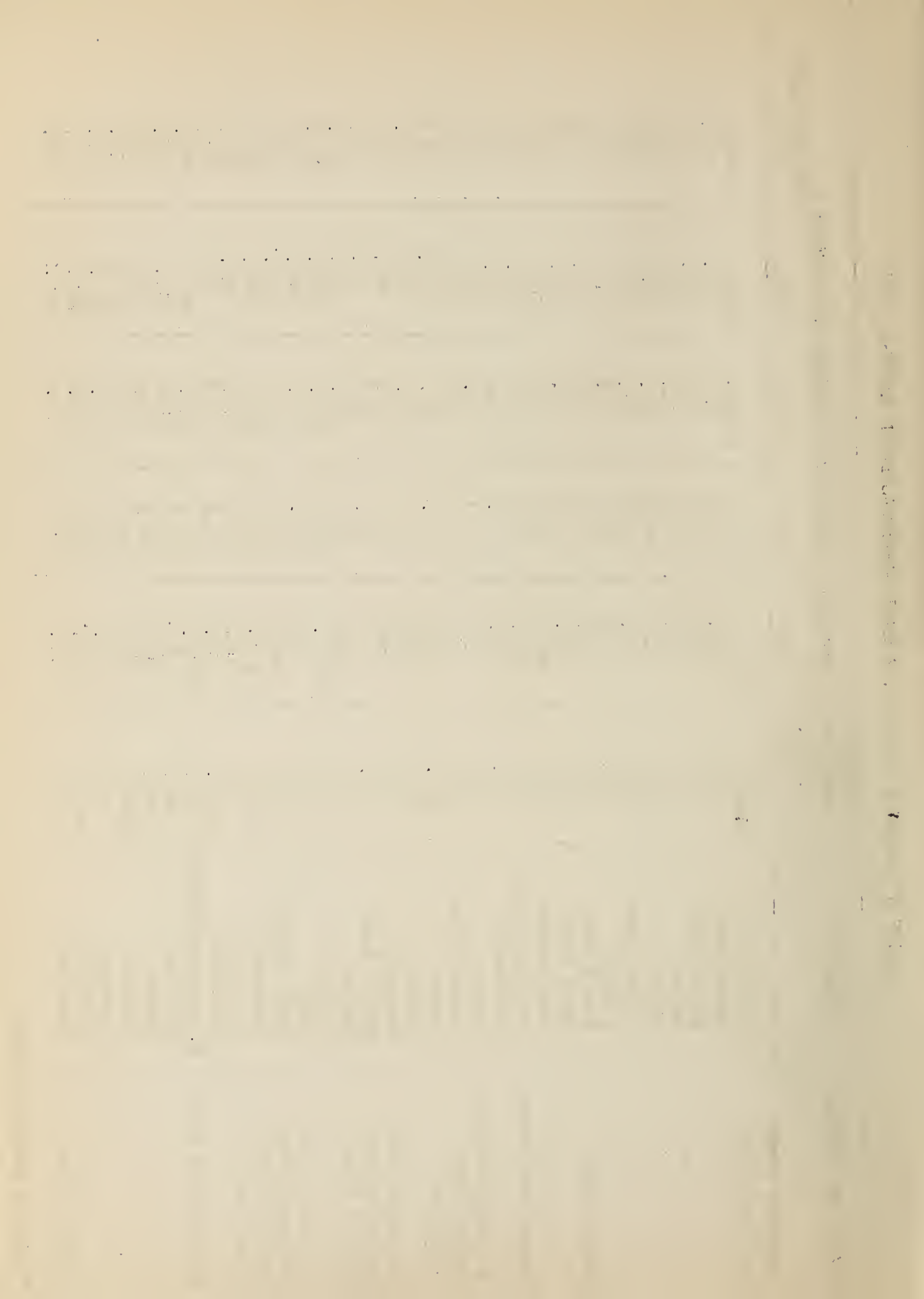
#### Arkansas River

The general outlook for irrigation water supply in the Arkansas valley is much better than a year ago. The snow at high elevations is only about 5 percent above average but the entire mountain area is snow covered. Precipitation in the valley areas has been well above normal throughout the winter season. Snow in the early winter, as well as recently, has left the soil moisture in the valley and plains area in excellent condition. On the Purgatoire River the water content of the snow is about 75 percent above last year. Over 6 inches of snow is on the ground at Trinidad. Reservoir storage is generally lower than a year ago. In the Great Plains Reservoir there is now in storage about 71,700 acre-feet as compared to 122,700 a year ago.



BASIN AND STREAM	RESERVOIR	USABLE CAPACITY (Thous. A.F.)	THOUSANDS ACRE FEET IN STORAGE About March 1				10-year Avg.* 1936-45
			1947	1946	1945	1944	
MISSOURI RIVER							
Missouri River	Fort Peck	19000.0	13850.0	12890.0	10720.0	9508.0	5863.0
" "	Canon Ferry	37.8	30.0	35.8	37.0	37.4	22.9
" "	Hauser Lake	52.7	49.0	51.7	51.1	50.6	37.6
" "	Holter	73.6	56.5	76.0	76.5	58.2	43.4
" "	Gibson	105.0	58.2	64.2	59.2	64.2	52.8
" "	Willow Creek	32.4	13.6	10.8	21.5	17.1	9.6
" "	Pishkun	32.0	17.2	22.7	17.2	17.9	11.5
" "	Four Horns	20.0	10.4	5.5	5.3	7.5	7.9
Marias River	Birch Creek	30.0	28.3	20.6	22.4	23.8	15.4
" "	Lake Francis	112.0	100.6	95.4	98.4	105.3	50.0
" "	Deadmans Basin	52.5	47.0	--	47.2	49.5	43.7
Musselshell River	Martindale	23.0	8.8	9.5	11.4	10.1	8.5
" "	Cooney	27.5	--	5.1	9.0	6.5	12.1
Yellowstone River	Tongue River	73.9	3.6	--	6.3	11.2	7.7
Tongue River	Fresno	127.2	55.2	50.4	41.5	71.4	33.2
Milk River	Nelson	66.8	26.6	--	37.7	42.5	28.7
" "	Sherburne	66.0	24.4	20.2	21.3	10.3	12.9
St. Marys River	Mystic Lake	20.8	--	11.5	10.7	9.0	5.7
Gallatin River	Madison	41.0	34.3	37.9	35.5	30.4	28.2
Madison River	Hebgen	345.0	267.6	209.5	217.7	236.8	190.3
" "	Ruby	39.0	31.2	36.0	28.2	27.4	26.4
Jefferson River	Belle Fourche	198.1	149.8	133.3	123.7	102.6	74.0
Cheyenne River	Shoshone	456.6	306.9	361.6	288.0	329.7	271.9
Shoshone River	Pilot Butte	30.0	11.1	16.2	17.1	23.5	17.7
Wind River	Bull Lake	155.0	75.2	53.4	54.8	78.5	51.7
" "	Kingsley-Sutherland	2180.0	1208.3	1185.2	780.0	720.5	305.7
North Platte River	Minatare	60.8	18.8	19.0	19.8	11.6	18.2
" "	Alcova	190.0	83.7	36.8	17.4	73.0	48.2
" "	Seminole	1020.0	339.0	554.5	117.0	167.6	117.1
" "	Guernsey	46.1	44.0	43.2	42.2	37.5	31.6
" "	Pathfinder	1045.5	415.4	362.6	259.8	280.0	177.7
" "	Wheatland	70.4	22.7	36.5	17.3	30.2	18.3
Laramie River							

\*Some for shorter periods





BASIN AND STREAM	RESERVOIR	USABLE CAPACITY (Thous. A.F.)	THOUSANDS ACRE FEET IN STORAGE About March 1				10-year Avg.* 1936-45
			1947	1946	1945	1944	
MISSOURI RIVER							
Poudre River	Windsor	18.6	9.4	11.7	6.0	12.3	8.2
"	Cache la Poudre	9.5	5.9	8.3	3.1	8.3	5.9
"	Fossil Creek	11.6	8.1	7.3	2.2	6.2	5.7
"	Terry Lake	8.2	4.1	4.0	4.1	4.2	4.4
"	Halligan	6.4	3.6	0.0	0.0	0.0	2.0
"	Chamber's Lake	8.8	2.6	2.0	1.5	1.6	2.4
"	Cobb Lake	34.3	0.4	4.4	8.7	8.4	3.4
"	Black Hollow	8.0	4.8	4.1	2.2	4.6	2.5
Big Thompson River	Lake Loveland	14.3	0.0	8.0	3.6	4.4	3.6
"	Boyd Lake	44.0	4.8	24.8	26.0	26.5	10.2
"	Lone Tree	9.2	7.5	3.5	2.3	2.0	5.1
"	Mariano	5.4	1.7	2.9	1.5	1.4	2.4
St. Vrain River	Union	12.7	5.5	9.2	5.5	6.9	5.6
Boulder Creek	Barker Meadow	11.7	--	0.6	--	5.2	4.2
South Platte River	Eleven Mile	81.9	81.9	81.9	81.9	81.9	64.7
"	Cheeseman	79.0	48.0	73.2	58.4	66.2	53.4
"	Marston	18.9	16.0	16.5	16.2	16.1	15.8
"	Barr Lake	32.2	25.4	25.5	17.4	17.2	15.3
"	Milton	24.4	18.8	15.1	7.7	5.8	6.5
"	Standley	18.5	8.8	16.3	9.5	7.2	10.8
"	Marshall	10.3	2.3	4.7	1.5	0.8	2.3
"	Antero	33.0	20.0	20.1	12.6	20.3	12.7
"	Horse Creek	20.6	13.5	12.8	7.7	5.9	5.0
"	Riverside	57.5	55.4	53.9	39.3	43.1	37.9
"	Empire	37.7	32.1	29.9	26.3	26.1	24.5
"	Jackson Lake	35.4	30.0	31.7	31.2	32.9	31.6
"	Prewitt	32.8	28.1	28.4	15.4	12.6	15.8
"	Point of Rocks	70.0	55.1	67.9	51.5	50.4	45.9
"	Julesburg	28.2	20.7	20.3	20.3	20.7	20.3

\*Some for shorter periods





# RESERVOIR STORAGE, Cont.

BASIN AND STREAM	RESERVOIR	USABLE CAPACITY (Thous. A. F.)	THOUSANDS ACRE FEET IN STORAGE ABOUT March 1				
			1947	1946	1945	1944	10-year Avg. 1936-45*
ARKANSAS RIVER	Twin Lakes	57.9	21.2	40.1	16.5	28.7	23.0
Arkansas River	Sugar Loaf	17.4	7.7	12.8	6.5	7.3	7.5
"	Clear Creek	11.4	4.0	8.8	7.9	2.3	3.5
"	Meredith	41.9	27.0	26.1	37.4	27.6	15.0
"	Horse Creek	26.9	17.2	18.1	16.1	0.0	9.2
"	Adobe Creek	61.6	31.6	49.1	36.0	26.4	19.0
"	Cucharas	40.0	2.3	5.5	11.8	1.0	7.9
"	Two Buttes	40.9	7.9	0.3	1.0	0.0	14.0
"	John Martin	655.0	53.8	50.4	49.0	21.0	37.4
"	Great Plains	150.0	71.7	122.7	113.5	11.3	23.4
Purgatoire River	Model**	15.0	2.6	2.2	4.0	3.6	4.8

\*Some for shorter periods.

\*\*Resurveyed in 1946

## SNOW SURVEYS AND IRRIGATION WATER FORECASTS FOR MISSOURI AND ARKANSAS RIVERS

March 1, 1947

### P R E C I P I T A T I O N   D A T A

WATERSHED	STATE	Precipitation		Departure		Precipitation		Departure	
		October 1 to February 28*		from Normal		February		from Normal	
		Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
Missouri	East.Mont.	3.62	+0.72	+0.72	0.29	-0.26	-0.26	-0.08	-0.08
Missouri	Cent.Mont.	5.05	+1.32	+1.32	0.52	-0.34	-0.34	+0.03	+0.03
Missouri	North Wyo.	7.71	+0.90	+0.90	0.96	1.14	1.14	-0.09	-0.09
North Platte	Wyoming	4.29	+0.62	+0.62	0.93				
South Platte	Colorado	7.66	+3.96	+3.96	1.14				
Arkansas	Colorado	6.29	+2.09	+2.09	0.85				

February precipitation was below normal except on the North Platte in Wyoming and South Platte in Colorado. Seasonal precipitation is above normal in all cases.

\*February precipitation tentative



SUMMARY OF MARCH 1 SNOW SURVEYS AND COMPARISON OF DATA  
WITH THAT OF PREVIOUS YEARS BY WATERSHEDS

WATERSHEDS	Snow Depth		Water Content		Number Courses in Average	Snow Density		1947 Water Content in percent of	
	Twelve Year Avg.*	1946	Twelve Year Avg.*	1947		Twelve year Avg.*	1946	Twelve year Avg.*	1946
	In.	In.	In.	In.		Percent	Percent	Percent	Percent
MISSOURI RIVER									
Jefferson River	33.6	36.3	8.8	12.5	6	26	30	142	108
Madison River	56.1	63.8	17.7	20.7	6	32	32	117	101
Gallatin River	32.7	39.3	8.7	10.0	7	27	28	115	92
Musselshell River	18.0	16.2	3.8	5.6	2	21	21	147	105
Missouri River**	28.5	27.7	7.0	10.3	11	25	27	147	136
Marias River	44.6	47.6	13.9	23.3	1	31	33	168	147
Yellowstone River	31.2	32.2	7.3	8.7	5	23	25	119	108
Milk River	18.1	22.8	4.6	4.7	1	25	24	102	86
Shoshone River	50.2	51.4	14.4	20.7	2	29	28	144	143
Bighorn River	30.7	30.6	8.0	13.2	7	26	27	127	123
Powder River	28.8	32.6	6.1	7.5	1	21	...	123	--
North Platte River	49.5	46.8	14.2	15.8	10	29	30	111	112
Sweetwater River	35.7	37.1	9.1	10.1	2	25	29	111	93
Laramie River	34.6	34.9	8.9	10.0	8	26	26	112	111
Cheyenne River	20.0	17.2	4.2	3.7	3	21	17	88	123
South Platte River***	20.5	24.5	4.4	5.8	3	21	22	132	107
Crow Creek	15.5	11.9	3.6	5.1	1	22	20	141	212
Poudre River	35.5	37.7	9.6	10.4	5	27	29	108	95
Big Thompson River	45.2	43.9	11.6	11.8	2	26	23	102	97
St. Vrain River	36.3	32.8	9.0	11.3	1	25	27	126	127
Boulder Creek	29.2	32.0	8.6	13.0	2	29	34	151	118
Clear Creek	51.1	46.5	11.5	13.8	2	23	29	120	101
ARKANSAS RIVER	30.4	23.5	7.5	7.8	8	25	25	104	134

\*Some for shorter periods.

\*\*Between Helena and Great Falls

\*\*\*Above Denver, Colo.



## MISSOURI-ARKANSAS RIVERS SNOW SURVEYS, March 1, 1947

DRAINAGE BASIN and SNOW COURSE	LOCATION			SNOW COURSE MEASUREMENTS					Past Record Av. Water Content (Inches)
	No. and State	Sec.	Twp.	Range	Elev.	Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Years of Record
MISSOURI RIVER									
JEFFERSON RIVER									
Camp Creek*	6 Ida	21	13N	36E	6800	2/28	34.0	1947	12
Moose Creek*	7 "	27	27N	21E	6200	2/28	55.5	9.6	8.1
Gibbons Pass	10 Mont.	4	2S	19W	7100	3/2	73.3	19.2	10.9
Pipestone Pass	30 "	11	1N	7W	7200	3/4	27.0	25.5	15.6
Elkhorn Hot Spg	"	15	4S	12W	8450	2/27	40.7	5.7	2.6
Picnic Grounds	"	22	5N	6W	6500	2/27	20.8	11.0	4.9
Dell	"	8	13S	9W	6100	2/28	0	3.9	1.4
Dicky Bridge	"	11	1N	12W	5700	2/28	7.8	0	0.4
							<u>41.9</u>	<u>2.0</u>	<u>--</u>
					Average for drainage			<u>12.5</u>	<u>7.2</u>
MADISON RIVER									
Aster Creek*	2 Wyo.		44.3N	110.6W	7700	2/17	78.0	29.6	16.4
Lewis L.Divide*	8 "		44.2N	110.7W	7900	2/17	101.0	39.1	26.0
Norris Basin	11 "		44.3N	110.7W	7500	3/4	39.3	8.9	7.3
Big Springs*	3 Ida.	34	14N	44E	6500	2/25	58.0	17.5	13.3
West Yellowstone	16 Mont.	34	13S	5E	6700	3/1	37.1	10.3	6.7
Twenty-one Mile*	"	1	11S	5E	7150	3/1	52.5	16.1	8.6
Hebgen Dam	"	22	11S	3E	6550	3/1	42.9	11.5	7.2
					Average for drainage		<u>61.6</u>	<u>20.7</u>	<u>13.1</u>
GALLATIN RIVER									
Devil's Slide	Mont.	14	5S	6E	8100	2/27	63.6	16.0	10.9
Flood Meadow Extn.	"	22	4S	6E	6600	2/27	31.0	6.2	4.2
Mystic Lake No. 1	"	31	3S	7E	6600	3/3	29.5	8.1	5.1
Mystic Lake No. 2	"	31	3S	7E	6600	3/3	27.2	7.3	3.3
Twenty-one Mile	"	1	11S	5E	7150	3/1	52.5	16.1	8.6
Ross Peak	"	10	1N	6E	7000	3/1	23.0	5.4	4.5
New World Trail	"	13	3S	6E	7000	3/3	37.5	10.7	5.5
					Average for drainage		<u>37.5</u>	<u>10.0</u>	<u>6.0</u>
MUSSEL SHELL RIVER									
Grasshopper*	Mont.	19	9N	8E	7000	3/1	24.1	5.2	3.5
Orville Harris	"	31	10N	9E	6500	2/28	28.4	6.0	3.8
					Average for drainage		<u>26.2</u>	<u>5.6</u>	<u>3.6</u>

\*Adjacent Drainage





## MISSOURI-ARKANSAS RIVERS SNOW SURVEYS, March 1, 1947

DRAINAGE BASIN and SNOW COURSE	LOCATION				Elev.	Date of Survey	Snow Depth (Inches)	SNOW COURSE MEASUREMENTS		
	No. and State	Sec.	Twp.	Range				Water Content (Inches)	Years of Record	
MISSOURI RIVER**										
Chessman Res.	6 Mont.	2	8N	6W	6200	2/28	23.6	1947	1945	12
Goat Mountain	11 "		45.5N	112.9W	7000	3/1	49.2	16.1	4.6	12
Stemple Pass	36 "	16	13N	7W	6900	2/28	44.4	12.0	6.8	12
Lower Rimini	41 "	13	8N	6W	6250	3/1	36.8	9.1	3.4	12
Middle Rimini	42 "	13	8N	6W	6800	3/1	46.6	13.0	5.6	12
Upper Rimini	43 "	19	8N	5W	8000	3/1	53.8	16.3	7.4	12
Grasshopper	27 "	19	9N	8E	7000	3/1	24.1	5.2	3.5	9
King's Hill	25 "	35	13N	7E	7950	3/3	49.3	13.5	8.8	12
Orville Harris*	26 "	31	10N	9E	6500	2/28	28.4	6.0	3.8	9
Half Moon	23 "	22	12N	18E	6000	3/4	28.8	6.7	3.7	7
Crystal Lake	24 "	24	12N	17E	5500	3/4	43.2	9.7	6.3	6
			Average for drainage				38.9	10.3	5.0	
MARIAS RIVER										
Desert Mountain	7 Mont.	24	31N	19W	5600					12
Marias Pass	20 "		48.3N	113.4W	5250	3/1	63.4	23.3	9.6	
			Average for drainage							
YELLOWSTONE RIVER										
Lupine Creek	40 Wyo.		44.9N	110.6W	7300	3/4	36.7	8.1	3.9	8
Blacktail Leer Cr	41 "		44.9N	110.6W	7500	3/4	41.1	10.0		7
Camp Senia	11 Mont.	2	8S	18E	7870					
Canyon	2 Wyo.		44.7N	110.5W	7750	3/1	42.8	11.4	7.1	10
Cook City	10 Mont.	25	9S	14E	7400				3.8	
Crevice Mtn. #1	5 "	26	9S	9E	8400	3/1	38.0	8.8	5.9	9
Crevice Mtn. #2	6 "	26	9S	9E	8300	3/1	41.2	9.5	6.1	9
Lake Camp	7 Wyo.		44.6N	110.4W	7850	3/1	37.4	9.5	6.8	11
Porcupine	7 Mont.	10	4N	10E	6500	3/1	18.0	4.1	2.8	9
Hell's Canyon	8 "	23	5S	12E	6000	3/4	14.6	4.1	4.2	6
Independence	9 "	22	7S	12E	8000				9.7	
			Average for drainage				35.5	8.7	5.7	
MILK RIVER										
Rocky Boy	22 Mont.	15	82N	16E		2/27	18.3	5.7	4.5	7

\*Adjacent. Drainage. \*\*Between Helena and Great Falls





## MISSOURI-ARKANSAS RIVERS SNOW SURVEYS, March 1, 1947

## SNOW COURSE MEASUREMENTS

## LOCATION

DRAINAGE BASIN and SNOW COURSE	LOCATION			Elev.	Late of Survey	Snow Depth (Inches)	Water Content (Inches)			Years of Record	Past Record Av. Water Content (Inches)	
	No. and State	Sec.	Twp.				Range	1947	1946			1945
MISSOURI RIVER												
SHOSHONE RIVER												
Sylvan Pass	32 Wyo.	12	52N	110W	7100	2/28	43.7	10.8	10.9	10.1	5	12.1
Brooks Lake #3*	50 "	23	44N	110W	9200	3/2	81.9	30.6	18.1	15.1	11	16.8
			Average for drainage				62.8	20.7	14.5	12.6		14.4
BIG HORN RIVER												
Togwotee Pass	12 Wyo.	29	44N	110W	9600	3/3	90.3	28.4	...	27.0	2	27.7
Sawmill Glade	45 "	3	31N	101W	8500	2/28	14.0	3.7	3.9	4.6	7	4.3
Blue Ridge	46 "	23	31N	101W	9500	2/28	33.1	8.5	8.1	5.8	8	7.4
South Pass	47 "	13	30N	101W	9000	3/1	40.0	10.4	11.4	7.6	8	9.2
Sheridan Cr. R.S.	49 "	3	42N	109W	7500	3/2	27.9	4.6	5.4	5.7	11	5.6
Brooks Lake #3	50 "	23	44N	110W	9200	3/2	81.9	30.6	18.1	15.1	11	16.8
St. Lawrence R.S.	51 "	26	1N	4W	9000				...	--		
Mosquito Park R.S.	52 "	23	2S	3W	9500				...	--		
DuNoir	53 "	27	42N	108W	8750	3/3	36.1	7.3	6.9	6.5	7	7.5
T-Cross Ranch	54 "	1	43N	107W	8000	2/27	28.4	6.3	4.0	3.5	7	5.5
			Average for drainage				37.3	10.2	8.3	7.6		8.0
POWDER RIVER												
Red Fork	30 Wyo.	18	43N	83W	7500	2/27	32.6	7.5	...	4.1	7	6.1
SWEETWATER RIVER												
Grannier Meadows	29 Wyo.	19	30N	100W	9000	2/28	37.6	9.8	10.2	8.0	11	9.0
South Pass*	47 "	13	30N	101W	9000	3/1	40.0	10.4	11.4	7.6	8	9.2
			Average for drainage				38.8	10.1	10.8	7.8		9.1
CHEYENNE RIVER												
Upper Spearfish	1 S. Dak	21	3N	1E	6500	3/1	19.7	4.0	4.0	6.3	4	5.1
Upper Castle	2 "	24	2N	1E	6800	3/1	21.1	3.8	3.3	4.7	4	4.4
Deerfield	3 "	23	1N	2E	6000	2/27	11.1	3.3	1.6	3.2	4	3.1
			Average for drainage				17.3	3.7	3.0	4.7		4.2

\*On adjacent drainage



DRAINAGE BASIN and SNOW COURSE	LOCATION				SNOW COURSE MEASUREMENTS						
	No. and State	Sec.	Twp.	Range	Elev.	Water Content (Inches)			Years of Record	Past Record Av. Water Content (Inches)	
						Date of Survey	Snow Depth (Inches)	1945			
MISSOURI RIVER											
NORTH PLATTE RIVER											
Cameron Pass	1 Colo	2	6N	76W	10300	3/2	68.4	11	15.2	15.7	
Park View	7 "	24	5N	78W	9200	2/28	41.8	12	6.4	7.3	
Columbine Lodge	8 "	21	5N	82W	9300	3/3	72.5	12	17.6	17.8	
Willow Cr. Pass*	62 "	1	4N	78W	9500	2/28	50.7	10	9.3	9.2	
Bottle Creek	7 Wyo.	24	14N	85W	8200	3/3	39.3	10	10.8	9.9	
Webber Creek	8 "	27	14N	85W	9000	3/3	53.4	10	13.8	12.9	
Old Battle	9 "	29	14N	85W	9800	3/3	90.5	11	21.2	24.2	
N. French Creek	"	27	16N	80W	10200	2/27	87.0	10	22.4	22.6	
N. Barrett Creek #2	37 "	30	16N	80W	9400	2/27	61.4	11	12.9	14.3	
Ryan Park #2	39 "	34	16N	81W	8400	2/27	37.3	11	7.6	8.1	
			Average for drainage				60.2		13.7	14.2	
LARAMIE RIVER											
Brooklyn Lake	3 Wyo.	11	16N	79W	10200	2/27	57.4	11	16.2	16.1	
Fox Park	11 "	21	13N	78W	9200	3/3	32.5	11	9.0	6.9	
Pole Mtn. #2*	34 "	35	15N	72W	8700	3/3	20.7	11	4.5	3.6	
Libby Lodge #2	35 "	29	16N	78W	8700	2/27	30.3	10	7.9	6.7	
Hairpin Turn #2	36 "	24	16N	79W	9500	2/27	35.1	10	8.5	7.6	
W. Port. G-P Tun.	4 Colo.	7	8N	75W	8600	3/2	31.6	11	7.4	6.6	
Deadman Hill*	50 "	26	10N	75W	10200	2/27	53.5	11	10.7	10.1	
Roach	88 "	5	10N	77W	9800	3/1	68.2	8	13.4	13.5	
			Average for drainage				41.2		9.7	8.9	
CROW CREEK											
Pole Mtn. #2	34 Wyo.	35	15N	72W	8700	3/3	20.7	11	4.5	3.6	
POUDRE RIVER											
Cameron Pass	1 Colo.	2	6N	76W	10300	3/2	68.4	11	15.2	15.7	
Chambers Lake	2 "	6	7N	75W	9000	3/1	26.5	11	7.5	5.3	
Big South	3 "	33	8N	75W	8600	3/1	14.5	10	3.4	1.8	
Leadman Hill	50 "	26	10N	75W	10200	2/27	53.5	11	10.7	10.1	
Lake Irene*	65 "	8	5N	75W	10600	2/28	69.5	10	15.8	15.3	
Hour Glads Lake	68 "	18	7N	73W	9500	--	--		7.5	--	
			Average for drainage				46.5		10.5	9.6	
			Average for drainage				10.4		10.5		
			Average for drainage				5.4		7.5		
			Average for drainage				11.0		10.5		

\*On adjacent drainage

\*On adjacent drainage



# MISSOURI-ARKANSAS RIVERS SNOW SURVEYS, March 1, 1947

DRAINAGE BASIN and SNOW COURSE		LOCATION			SNOW COURSE MEASUREMENTS									
		No. and State	Sec.	Twp.	Range	Elev.	Date of Survey	Snow Depth (Inches)	Water Content (Inches)			Years of Record	Past Record Av. Water Content (Inches)	
MISSOURI RIVER														
BIG THOMPSON RIVER		65 Colo. 95 "	8 23	5N 5N	75W 74W	10600 9550	2/28 3/2	69.5 44.0 56.8	1945	1946	1947	10	15.3	
Lake Irene*									15.8	17.7	13.4	7	7.9	
Hidden Valley #2									8.4	6.6	10.3		11.6	
				Average for drainage				56.8	12.1	12.2	11.8			
ST. VRAIN RIVER		41 Colo. Wild Basin	24	3N	74W	10000	2/27	50.2	1945	1946	1947	11	9.0	
									9.5	8.9	11.3			
BOULDER CREEK		5 Colo. 60 "	2 28	2S 1N	74W 73W	9400 10300	3/3 3/7	27.0 63.8 45.4	1945	1946	1947	11	3.0	
E. Port. Moffat T. University Camp #2									4.5	1.8	6.8	11	14.1	
				Average for drainage					16.0	20.2	19.3		8.6	
CLEAR CREEK		61 Colo. 97 "	37 2	4S 5S	76W 76W	10100 11250	3/3 3/3	53.1 58.3 55.7	1945	1946	1947	11	9.8	
Loveland Pass #2 Grizzly Peak*									10.2	12.3	12.6	6	13.2	
				Average for drainage					10.8	14.8	15.0		11.5	
SOUTH PLATTE RIVER		14 Colo. 15 "	13 33	8S 9S	78W 77W	11400 10000	2/28 2/28	41.2 11.6 42.9	1945	1946	1947	11	7.4	
Hoosier Pass Fairplay									5.2	8.9	7.3	10	0.5	
Jefferson Cr. #2		83 "	14	7S	76W	10100	2/28	42.9	0.5	7.4	8.6	9	5.3	
				Average for drainage				31.9	4.2	5.4	5.8		4.4	
ARKANSAS RIVER														
ARKANSAS RIVER		19 Colo. 21 "	21 22	8S 11S	80W 82W	10200 10500	2/28 2/27	45.0 41.1 41.7	1945	1946	1947	12	7.2	
Tennessee Pass Twin Lakes T.									5.8	6.0	8.1	10	8.1	
Marshall Cr. *		42 "	24	48N	6E	10800	3/1	41.7	7.1	7.1	9.1	12	9.7	
Poncha Cr.		43 "	19	48N	7E	10500	3/1	26.5	10.3	6.4	6.0	12	8.0	
Whiskey Cr. #2		72 "		37.2N	105.2W	10300	2/28	26.3	9.7	4.5	4.7	10	5.6	
La Veta Pass #2*		74 "	22	28S	70W	9300	2/28	30.9	5.7	2.8	8.0	10	6.9	
four Mile Park #2		78 "	23	11S	81W	9700	2/28	26.0	9.0	4.6	4.5	9	2.8	
Fremont Pass #2*		79 "	2	8S	79W	11400	3/3	64.5	1.6	1.7	4.5	12	11.9	
Monarch Pass		92 "	16	49N	6E	10500	2/28	59.1	8.6	13.3	13.4	6	12.7	
				Average for drainage				37.8	11.3	...	12.7		7.5	
								7.8	7.2	5.8	7.8			
*On adjacent drainage														

\*On adjacent drainage





The following organizations cooperate in the snow surveys and irrigation water supply forecasts for the Colorado, Missouri-Arkansas and Rio Grande watersheds by furnishing funds or services.

STATE

Colorado State Engineer  
Wyoming State Engineer  
Utah State Engineer  
New Mexico State Engineer  
Montana State Engineer  
Nebraska State Engineer  
Colorado Experiment Station  
Colorado Extension Service  
Montana Experiment Station  
Utah Experiment Station

FEDERAL

Department of Agriculture  
    Forest Service  
    Soil Conservation Service  
Department of Interior  
    Bureau of Reclamation  
    Indian Service  
    Geological Survey  
    National Park Service  
Department of Commerce  
    Weather Bureau  
War Department  
    Army Engineer Corps

PUBLIC UTILITIES

Colorado Public Service Company  
Western Colorado Power Company  
Montana Power Company  
Denver and Rio Grande Western R. R. Company

MUNICIPALITIES

City of Bozeman  
City of Denver  
City of Boulder

WATER USERS ORGANIZATIONS

Poudre Valley Water Users' Association  
Arkansas Valley Ditch Association  
Colorado River Water Conservation District

IRRIGATION PROJECTS

Farmers Reservoir and Irrigation Company  
San Luis Valley Irrigation District  
Santa Maria Reservoir Company  
Costilla Land Company  
Uncompahgre Valley Water Users' Association  
Wyoming Development Company  
Goshen Irrigation District  
Kendrick Project  
Pathfinder Irrigation District  
Salt River Valley Water Users' Association  
San Carlos Irrigation and Drainage District  
Twin Lakes Reservoir and Canal Company

Many other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.

